# Ship Heading Control

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# Ship Heading Control

- Scope of project
- Current issues and procedures
- Benefits of heading control
- Possible solutions
- Conclusions

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# Ship Heading Control

## Scope of Project

- Investigate available technology capable of controlling the heading of ships relative to waves or currents.
- Limited to the T-ACS Auxiliary Crane ships

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# Ship Heading Control

## Current Issues and Procedures

- Ship roll motion, caused by long period waves, are primary detriment to cargo handling operations in heavy weather.
- Current hardware and procedures allow minimal heading control.
  - Stern anchoring system
  - Use of main engines and existing bow thrusters
  - Limited to very low sea states

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# Ship Heading Control

## Benefits

- Operational experience has shown that heading control can significantly reduce roll motion, the primary cause of cargo heave and pendulation.  Resulting in improved performance in heavy weather conditions.
- Heading control can also create lee which can be used as sheltered lighter stations.
- Facilitate ship-to-ship mooring process.

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# Ship Heading Control

## Possible Solutions

- Active Rudder
- Conventional Stern Thruster
- Right Angle Drive
- Deck Mounted Z-Drive
- Retractable Azimuth Thruster
- Rudder Propellers
- Tugboats

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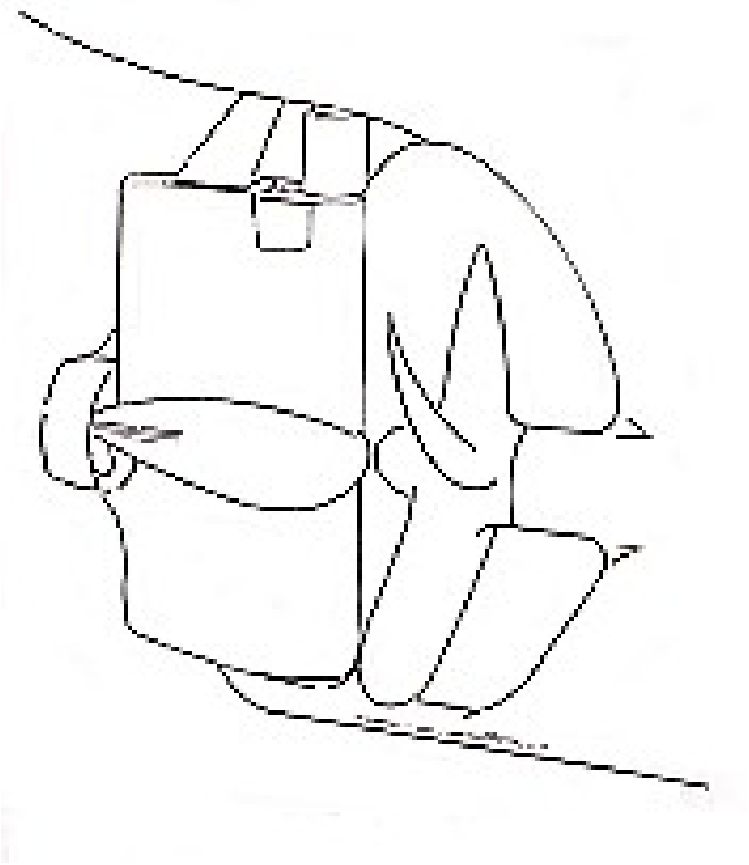
# Active Rudder



- Consists of a hydraulic or electric propulsor integrated into existing rudder
- Utilizes existing control system
- Minimal impact on ship
- Relatively low cost

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# Stern Tunnel Thruster

- Very effective system
- Requires extensive modification to vessel
- Relatively high total cost
- Not considered a practical options for existing vessels

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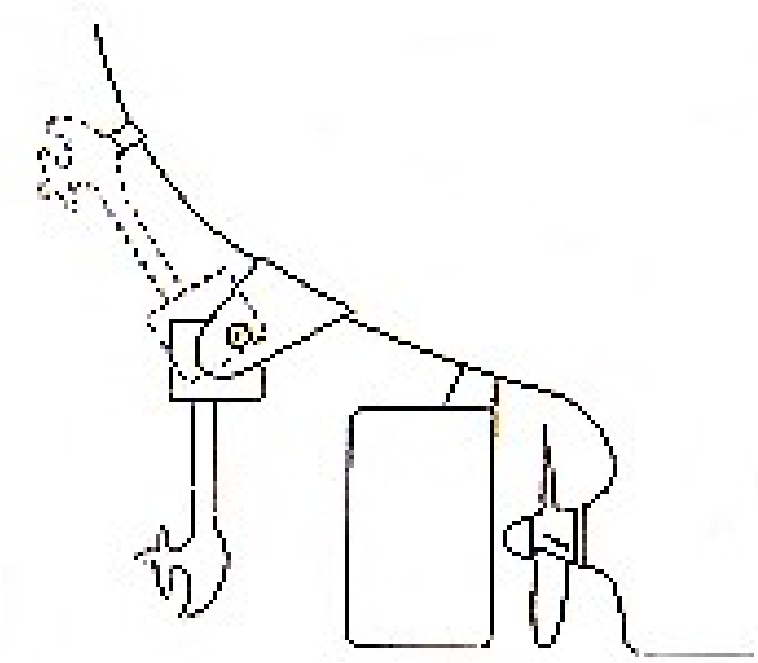
# Right Angle Drive



- Consists of a swing up propeller and pod
- Pod can rotate and steer 360°
- Relatively minor modification of existing vessel compared to other systems

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# Deck Mounted Z-Drive

- Units are portable and adaptable to any hull configuration
- Omni-directional thrust
- Easy installation and maintenance
- High initial cost coupled with low installation cost

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# Retractable Azimuth Thruster

- Consists of hydraulic power unit, propeller and nozzle, and retraction system
- Omni-directional thrust
- Requires extensive modification to vessel

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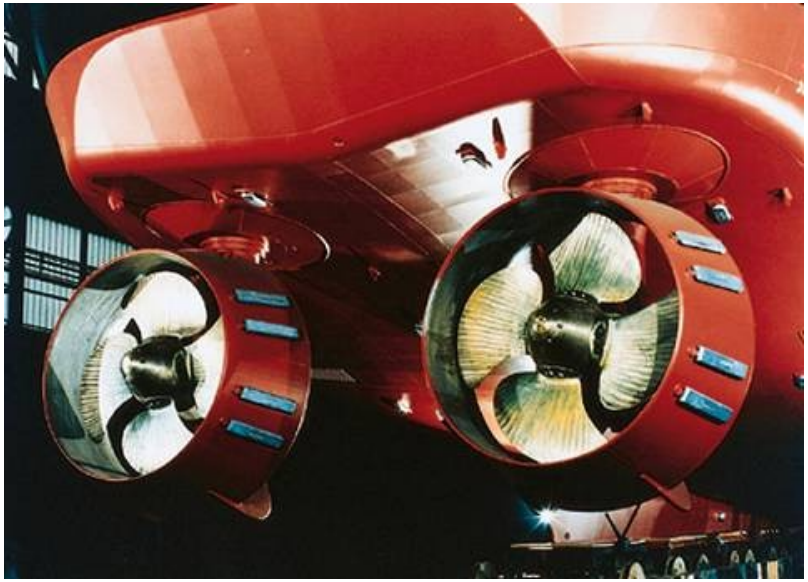
# Rudder Propellers



- Utilizes existing main engine
- Extensive vessel modification required
- High cost but effective

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# Tugboats

- No vessel modification
- Would require tugs to stay on station to control heading
- May require extra tugs in order to fulfill all JLOTS duties

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# Ship Heading Control

## Conclusions

- Heading control can significantly reduce roll motion in moored vessels, resulting in improved performance in heavy weather conditions.
- Produce lee which can act as a sheltered lighter station
- Several options are economically justifiable as possible solutions:
  - Active rudder
  - Deck mounted Z-drive
  - Tugboats

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# Ship Heading Control

Questions

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